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Z.D.			Z.D.		
°	"		°	"	
4	−0.55	to −0.54	49	−0.56	to −0.34
9	−0.43	−0.40	54	−0.50	−0.24
14	−0.33	−0.28	59	−0.23	+0.07
19	−0.31	−0.24	64	−0.17	+0.23
24	−0.25	−0.17	69	−0.36	+0.13
29	−0.07	+0.03	74	−0.80	−0.13
34	−0.05	+0.07	79	−1.07	−0.15
39	−0.22	−0.07	83½	−1.55	+0.01
44	−0.44	−0.26	85¾	−3.85	−0.62

If then the Washington observations were reduced with the mean refractions of the *Fundamenta* and the meteorological corrections of the *Tabulæ*, the agreement with the Cape observations would be very satisfactory if we may assume that the relative correction for errors of the adopted latitudes is small.

It appears from this investigation, and also from the comparison of the Cape and Greenwich Catalogues referred to above, that the tabular refractions used in the reduction of the Cape observations also require to be somewhat diminished.

1879, June 10.

*Ephemeris for Physical Observations of Mars, 1879–80. By A. Marth, Esq.*

Greenwich Noon.	Angle of Posit. of J's Axis.	Areographical W. Long.   Lat. of the Centre of J's Disk.		Dia-meter.	Amount and Posit. of Greatest Defect of Illumination.		Areocentric Ang. between Earth & Sun.
	°	°	Diff.	"	"	°	°
1879. July 29	143.34	299.53		10.38	1.66	250.39	47.11
		700.63					
31	143.19	280.16		10.51	1.67	250.68	47.03
		.64					
Aug. 2	143.06	260.80		10.64	1.69	250.98	46.93
		.66					
4	142.95	241.46		10.78	1.70	251.28	46.82
		.68					
6	142.85	222.14		10.92	1.72	251.58	46.70
		.71					
8	142.77	202.85		11.06	1.73	251.89	46.56
		.73					
10	142.71	183.58		11.21	1.74	252.20	46.40
		.75					
12	142.66	164.33		11.36	1.75	252.52	46.22
		.78					
14	142.62	145.11		11.51	1.76	252.84	46.03
		.79					
16	142.60	125.90		11.67	1.77	253.15	45.81
		.82					
18	142.59	106.72		11.83	1.77	253.47	45.58
		.85					

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June 1879.

Physical Observations of Mars, 1879-80.

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Greenwich Noon.		Angle of Posit. of $\delta$ 's Axis.	Areographical W. Long. of the Centre of Diff.	Lat. of $\delta$ 's Disk.	Dia-meter.	Amount and Posit. of Greatest Defect of Illumination.		Areocentric Ang. between Earth & Sun.
1879.		°	°	°	"	"	°	°
Aug.	20	142°60	87°57	13°79	11°99	1°78	253°79	45°32
	22	142°61	68°45	13°46	12°16	1°78	254°11	45°04
	24	142°64	49°35	13°13	12°34	1°79	254°42	44°74
	26	142°67	30°28	12°81	12°52	1°79	254°74	44°41
	28	142°71	11°23	12°50	12°70	1°78	255°05	44°06
	30	142°76	352°22	12°20	12°89	1°78	255°35	43°68
			700°99					
			701°02					
Sept.	1	142°82	333°24	-11°91	13°08	1°78	255°65	43°27
	3	142°88	314°28	11°63	13°27	1°77	255°94	42°84
	5	142°94	295°36	11°37	13°48	1°76	256°23	42°37
	7	143°01	276°47	11°11	13°68	1°75	256°51	41°88
	9	143°08	257°61	10°87	13°89	1°73	256°78	41°35
	11	143°15	238°79	10°64	14°11	1°71	257°04	40°78
	13	143°22	220°01	10°43	14°33	1°69	257°29	40°18
	15	143°29	201°26	10°24	14°55	1°66	257°53	39°54
	17	143°36	182°56	10°07	14°78	1°63	257°75	38°85
	19	143°42	163°90	9°91	15°02	1°60	257°96	38°13
	21	143°48	145°28	9°78	15°25	1°56	258°16	37°36
	23	143°53	126°70	9°67	15°49	1°52	258°34	36°55
	25	143°58	108°17	9°58	15°73	1°47	258°50	35°69
	27	143°62	89°68	9°51	15°98	1°42	258°65	34°79
	29	143°65	71°24	9°46	16°22	1°37	258°77	33°83
			701°61					
Oct.	1	143°67	52°85	-9°44	16°47	1°31	258°88	32°83
	3	143°68	34°51	9°45	16°72	1°25	258°97	31°77
	5	143°68	16°22	9°48	16°96	1°19	259°03	30°66
	7	143°68	357°98	9°54	17°20	1°12	259°08	29°49
	9	143°66	339°80	9°62	17°44	1°04	259°10	28°26
	11	143°63	321°6	9°73	17°67	0°96	259°09	26°98
			°92					

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Greenwich Noon.	Angle of Posit. of $\delta$ 's Axis.	Areographical W. Long. of the Centre of $\delta$ 's Disk.	Lat.	Dia- meter.	Amount and Posit. of Greatest Defect of Illumination.		Areocentric Ang. between Earth & Sun.	
1879.	°	°	°	"	"	°	°	
Oct. 13	143°59	303°59	701°98	9°88	17°90	0°88	259°06	25°65
15	143°54	285°57	702°03	10°05	18°12	0°80	259°01	24°25
17	143°48	267°60	°08	10°24	18°32	0°72	258°93	22°80
19	143°41	249°68	°13	10°46	18°51	0°63	258°82	21°30
21	143°33	231°81	°18	10°71	18°69	0°55	258°70	19°74
23	143°25	213°99	°22	10°98	18°85	0°47	258°54	18°13
25	143°16	196°21	°27	11°27	18°99	0°39	258°36	16°48
27	143°07	178°48	°31	11°58	19°11	0°32	258°15	14°79
29	142°97	160°79	°34	11°91	19°20	0°25	257°92	13°05
31	142°88	143°13	702°36	12°26	19°27	0°19	257°65	11°29
Nov. 2	142°78	125°49	°40	—12°62	19°32	0°13	257°34	9°49
4	142°68	107°89	°41	12°98	19°34	0°09	257°0	7°68
6	142°59	90°30	°43	13°36	19°32	0°05	256°5	5°84
8	142°50	72°73	°43	13°74	19°28	0°03	255°8	4°00
10	142°42	55°16	°43	14°12	19°22	0°01	254°4	2°15
12	142°35	37°59	°43	14°49	19°12	0°00	...	0°06
14	142°28	20°02	°42	14°86	18°99	0°00	...	1°52
16	142°22	2°44	°39	15°22	18°84	0°02	77°9	3°26
18	142°16	344°83	°38	—15°57	18°66	0°04	77°1	5°12
20	142°11	327°21	°34	15°91	18°46	0°07	76°6	6°88
22	142°07	309°55	°30	16°23	18°23	0°10	76°16	8°60
24	142°04	291°85	°27	16°53	17°99	0°15	75°83	10°27
26	142°01	274°12	°22	16°81	17°73	0°19	75°56	11°91
28	141°99	256°34	°18	17°17	17°46	0°24	75°31	13°49
30	141°97	238°52	702°13	17°30	17°17	0°29	75°08	15°01
Dec. 2	141°95	220°65	°08	—17°52	16°87	0°35	74°88	16°49
4	141°94	202°73	702°03	17°71	16°57	0°40	74°69	17°91

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Greenwich Noon.	Angle of Posit. of $\delta$ 's Axis.	Arcographical W. Long. of the Centre of $\delta$ 's Disk.	Lat. Diff.	Dia-meter.	Amount and Posit. of Greatest Defect of Illumination.		Areocentric Ang. between Earth & Sun.	
1879.	°	°	°	"	"	°	°	
Dec. 6	141°92	184°76	701°98	17°88	16°25	0°46	74°53	19°28
8	141°91	166°74	°92	18°02	15°94	0°51	74°38	20°58
10	141°90	148°66	°87	18°14	15°62	0°56	74°25	21°83
12	141°89	130°53	°82	18°24	15°30	0°61	74°14	23°02
14	141°88	112°35	°76	18°32	14°98	0°66	74°05	24°15
16	141°88	94°11	°71	18°38	14°66	0°70	73°97	25°22
18	141°87	75°82	°66	18°41	14°35	0°74	73°90	26°23
20	141°86	57°48	°61	18°42	14°04	0°78	73°85	27°19
22	141°85	39°09	°56	18°41	13°74	0°81	73°82	28°10
24	141°84	20°65	°52	18°38	13°44	0°84	73°80	28°95
26	141°83	2°17	°47	18°33	13°14	0°87	73°80	29°75
28	141°82	343°64	°43	18°26	12°85	0°89	73°81	30°50
30	141°82	325°07	701°39	18°17	12°57	0°91	73°83	31°21
1880.								
Jan. 1	141°81	306°46	°35	18°07	12°30	0°93	73°87	31°87
3	141°80	287°81	°32	17°95	12°03	0°94	73°92	32°49
5	141°80	269°13	°28	17°81	11°77	0°95	73°98	33°07
7	141°81	250°41	°25	17°66	11°52	0°96	74°06	33°61
9	141°82	231°66	°21	17°49	11°28	0°97	74°15	34°11
11	141°83	212°87	°19	17°30	11°04	0°97	74°25	34°57
13	141°85	194°06	°15	17°10	10°81	0°98	74°37	34°99
15	141°88	175°21	°13	16°89	10°58	0°98	74°49	35°39
17	141°91	156°34	°11	16°66	10°37	0°98	74°63	35°75
19	141°95	137°45	°08	16°42	10°16	0°97	74°79	36°07
21	141°99	118°53	°06	16°17	9°95	0°97	74°95	36°37
23	142°05	99°59	°04	15°91	9°75	0°96	75°12	36°65
25	142°11	80°63	°02	15°63	9°56	0°96	75°31	36°89
27	142°19	61°65	701°00	15°34	9°38	0°95	75°51	37°11

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Greenwich Noon.	Angle of Posit. of J's Axis.	Areographical W. Long.   of the Centre of J's Disk.	Lat.	Dia- meter.	Amount and Posit. of Greatest Defect of Illumination.	Areocentric Ang. between Earth & Sun.
1880.	°	°	°	"	"	°
Jan. 29	142°27	42°65 700°98	15°04	9°20	0°94	75°72 37°31
31	142°36	23°63 700°97	14°73	9°03	0°93	75°94 37°48
Feb. 2	142°47	4°60 .95	-14°41	8°86	0°92	76°16 37°64
4	142°58	345°55 .94	14°08	8°70	0°91	76°40 37°77
6	142°71	326°49 .92	13°74	8°54	0°90	76°66 37°88
8	142°85	307°41 .92	13°39	8°39	0°89	76°92 37°97
10	143°00	288°33 .90	13°03	8°24	0°88	77°19 38°04
12	143°16	269°23 .89	12°66	8°10	0°86	77°47 38°09
14	143°34	250°12 .88	12°28	7°96	0°85	77°77 38°13
16	143°53	231°00 .86	11°89	7°83	0°84	78°07 38°15
18	143°73	211°86 .86	11°50	7°70	0°82	78°38 38°16
20	143°94	192°72 700°86	11°10	7°57	0°81	78°70 38°15
22	144°17	173°58	-10°69	7°45	0°79	79°03 38°13
1879 Aug. 14.		Winter solstice of Mars' northern hemisphere.				
1880 Jan. 21.		Spring equinox " " "				

The observations of the position-angles of the south solar spot, made in 1877, by Asaph Hall (*Astron. Nach.*, No. 2174), and by Schiaparelli (*Osservazioni astronomiche e fisiche sull'asse di rotazione e sulla topografia del pianeta Marte*. Roma, 1878), indicate that the determination of the direction of the planet's axis, deduced from the scanty observations of 1830-37, requires considerable corrections. A trustworthy new determination will only be feasible, in case proper observations are secured during at least the two next oppositions, 1879 and 1881-82. For this purpose several methods of observing will have to be tried and tested, in order that the best method for giving correct results may be ascertained. The want of sufficient agreement between the position-angles of Hall and Schiaparelli, which is obviously due to their different modes of observing, and which must be cleared up before the observations can be used with confidence, leaves considerable doubt respecting the amount of the correction of the predicted position-angles of the axis in 1877; but since both series indicate that the assumed inclination is chiefly in fault, I have thought it right to introduce in the present Ephemeris preliminary corrections, which will probably diminish the differences between the predicted and

observed position-angles of the axis, and which will considerably reduce the amount of the ultimate corrections required. The values, adopted in the computations, of the inclination and node of the plane of the equator of *Mars* in reference to that of the Earth are for 1880·0, inclination  $36^{\circ}26'$ , node  $47^{\circ}9'45''$ . As in previous cases, the data of the Ephemeris are to be interpolated directly for the times of the observations, the equation of light having already been duly taken into account. The amount  $q$ , and the position-angle  $Q$  of the greatest defect of illumination, may serve in reducing position-angles and distances, which have been observed in reference to the assumed centre of the illuminated disk, to the true centre of the planet. But the reductions depend on what is assumed by observers as the centre of the illuminated disk. If that point is fixed upon which bisects that diameter of the disk, which is perpendicular upon the line of cusp, or in position-angle  $Q$ , the distance between the true centre and the assumed centre is  $\frac{1}{2}q$ . But if the centre of gravity of the apparent disk or the point, lines laid through which bisect the illuminated area, is assumed to be the observed centre, its distance from the true centre is  $\frac{4q}{3\pi}$ . If  $p_1$  and  $s_1$  are the observed angle and distance referred to the assumed centre, the values  $p$  and  $s$  referred to the true centre are found in the first case by

$$s \sin (p-p_1) = \frac{1}{2}q \sin (p_1-Q),$$

$$s \cos (p-p_1) = s_1 - \frac{1}{2}q \cos (p_1-Q),$$

or, when  $s_1$  is not small, by approximate formulæ. In the second case,  $\frac{4q}{3\pi} = [9\cdot6278]$ ,  $q$  is to be substituted for  $\frac{1}{2}q$ .

A reference must be sufficient to the remarks made on page 307 of vol. xxxvii. respecting observations of the times and places of the passages across the central meridian of all the most distinct and well-defined points on the planet's surface which may serve as fundamental points of Areography. If observers cannot be induced to make these observations, the topography of the surface of *Mars* must remain in an unsatisfactory state.

The following list gives the areographic longitude and latitude of the centre of *Mars*, and also its apparent diameter, for the times of a number of sketches made chiefly during the oppositions of 1871, 1873, and 1877. A similar list of the sketches of 1862 and 1864 is to be found in the *Monthly Notices*, vol. xxxvii., pp. 305-307, and another in the *Astronomical Register*, vol. xv., pp. 153-154.

The present list comprises the sketches of—

- |                |   |
|----------------|---|
| Boeddicker, O. | (5 plates with 10 sketches in the <i>Veröffentlichungen von der Kgl. Sternwarte zu Göttingen</i> , 1878. It is assumed that m. Z. B. means "mittlere Zeit Berlin.") |
| Burton, Ch.    | (6 sketches, published in M. T. Terby's <i>Areographie</i> , Bruxelles, 1874. Figs. 10, 11, 20, 30, 42, 47.)  |

- Crossley & Gledhill. (1 sketch in Terby's *Aréographie*. Fig. 18.)
- Cruls, Luiz. (13 plates with 26 sketches in *Observatoire Impérial de Rio de Janeiro*, "Mémoire sur Mars." In the 6 cases marked corr., the assigned times are the corrected ones, not those on the plates.)
- Dreyer, J. (12 sketches, with "Notes on the physical appearance of the planet Mars, as seen with the Three-Foot Reflector at Parsonstown, during the opposition of 1877," in the *Scientific Transactions of the Royal Dublin Society for the year 1878*.)
- Gledhill, J. (4 sketches in Terby's *Aréographie*. Figs. 41, 46, 51, 52.)
- Green, N. (6 sketches of 1873 in the *Astronomical Register* for July, 1873. 5 of these sketches are reproduced in Terby's *Ar*. (Figs. 15, 43, 44, 48, 49.)
- (12 sketches of 1877, made at Madeira, to be published in Vol. xlv. of the *Memoirs of the Royal Astronomical Society*.)
- Knobel, E. B. (17 sketches of 1873 in the *Monthly Notices*, vol. xxxiii., p. 476, and an additional sketch in Terby's *Ar*. Fig. 31.)
- Knott, G. (5 sketches in Terby's *Ar*. Figs. 9, 26, 33, 34, 40.)
- Lehardelay (2 sketches in Terby's *Ar*. Figs. 32, 54, the times being assumed to be Paris times.)
- Lohse, O. (6 sketches of 1871, Nos. 5, 7, 8, 10, 11, 12 on Tafel 6 of the *Astron. Beobachtungen zu Bothkamp*.)
- (12 sketches of 1877 on Tafel 8 of the *Publicationen des Astrophysikalischen Observatoriums zu Potsdam*. No. 2.)
- (8 sketches of 1873, represented by woodcuts on pp. 127, 128 of the same publication.)
- Niessen, L. (5 plates with 42 sketches in "Observations sur l'Aspect physique de la planète Mars pendant l'opposition de 1877. Brux. 1877.)
- Schmidt, J. (5 sketches in Terby's *Ar*. Figs. 8, 16, 17, 21, 39.)
- Secchi, A. (1 sketch of 1864 in Terby's *Ar*. Fig. 45.)
- Terby, M. F. (12 sketches, fig. 15-26, in "Observations de Jupiter et de Mars faites à Louvain . . . en 1873." *Bulletin de l'Académie R. de Belgique*, vol. 36, No. 11.)
- (15 sketches in "Etudes sur la planète Mars," 11<sup>me</sup> notice. *Bulletin*, vol. 45, No. 1. The times are assumed to be Brussels times.)
- Trouvelot, L. (4 sketches on plate 22 of vol. 8 of the *Annals of Harvard College Observatory*.)
- Vogel, H. (3 sketches, Nos. 4, 6, 9, on Tafel 6 of the *Astron. Beobachtungen zu Bothkamp*.)
- Webb, T. W. (3 sketches in Terby's *Ar*. Figs. 13, 29, 53.)
- Weinek, L. (3 sketches in the paper *Sirius*, vol. xii., 1.)
- Wilson, T. M. (3 sketches in Terby's *Ar*. Figs. 14, 22, 50.)

Where the times of the commencement and of the completion of the sketch are given, the longitude of the centre of the disk refers to the mean of the times.



Areographical Long. and Lat. of the Centre of the Disk. °	Diameter. "		Times assigned to the Sketches.					
				h	m	h	m	
2'4	-22'4	Cruls VII. 1	1877	Sept. 1	7 30			Rio de Janeiro.
5'2	+21'1	Green, No. 5 ( <i>Ar. f. 48</i> )	73	May 16	9 15			Greenwich.
6'6	-22'4	Green 1	77	Sept. 1	10 40			Greenwich.
6'8	+25'1	Lehardelay ( <i>Ar. f. 32</i> )	71	Mar. 23	10 — 11			Paris.
7'5	+22'1	Trouvelot 2	73	May 24	9 30			Cambridge, Mass.
11'1	-24'2	Nielsen III. 1	77	Oct. 6	8			Brussels.
14'8	-24'4	Nielsen III. 3	77	Oct. 8	9 30			Brussels.
16'6	-24'5	Nielsen III. 5	77	Oct. 9	10 30			Brussels.
18'7	+20'5	Knobel 7	73	May 12	7 45			Greenwich.
19'0	+25'0	Webb ( <i>Ar. f. 29</i> )	71	Mar. 22	10 35			Greenwich.
19'4	-22'4	Terby 1	77	Aug. 30	10 30 10 45			Brussels.
19'7	-24'2	Terby 13	77	Oct. 6	8 30 8 40			Brussels.
21'5	-24'4	Dreyer II	77	Oct. 8	9 40			Greenwich.
24'2	+20'6	Terby f. 23	73	May 12	8 20 8 30			Brussels.
25'7	-24'1	Terby 12	77	Oct. 4	7 40—7 50			Brussels.
26'2	+21'5	Knobel 12	73	May 19	12 30			Greenwich.
27'8	-27'1	Nielsen V. 1	77	Nov. 10	6 55			Brussels.
29'4	-24'1	Nielsen II. 8	77	Oct. 4	8 (in text 11)			Brussels.
30'1	-22'5	Cruls VII. 2	77	Sept. 2	10 0			Rio de Janeiro.
30'9	+21'1	Knobel 10	73	May 16	11 0			Greenwich.



Areographical Long. and Lat. of the Centre of the Disk.	Diameter.		Times assigned to the Sketches.				
				h	m	h	
35.9	+25.1	14.3	1871	Mar. 23	12 20		Greenwich.
40.1	+25.0	14.3	71	Mar. 22	12 42		Bothkamp.
41.8	+20.3	16.5	73	May 10	8 10—8 40		Brussels.
43.2	-22.4	24.8	77	Sept. 1	13 10		Greenwich.
43.8	+22.9	13.0	73	June 20	9		Greenwich.
43.9	+25.1	14.3	71	Mar. 23	12 25—12 30		Dublin.
45.3	+22.0	15.7	73	May 23	11 30		Cambridge, Mass.
47.7	-24.2	20.4	77	Oct. 6	10 30		Brussels.
47.8	+20.6	16.4	73	May 12	10 25		Bothkamp.
49.0	-24.0	21.0	77	Oct. 3	? 11 10 (about)		Greenwich.
49.5	+20.4	16.4	73	May 11	9 15		Greenwich.
50.3	-23.7	21.8	77	Sept. 29	6 20		Brussels.
50.8	-22.4	24.7	77	Aug. 29	9 0		Rio de Janeiro.
53.1	-24.0	21.0	77	Oct. 3	9 36		Berlin.
57.9	+22.9	13.1	73	June 19	10 0		Bothkamp.
60.3	-22.4	24.8	77	Sept. 1	14 20		Greenwich.
60.4	+20.4	16.4	73	May 11	10 0		Greenwich.
64.1	-24.1	20.6	77	Oct. 5	11		Brussels.
64.7	+20.7	16.3	73	May 13	11 30		Greenwich.
65.4	-22.4	24.7	77	Aug. 29	10 0		Rio de Janeiro.

65.5	+24.8	14.2	Vogel No. 6	71	Mar. 18	12	4	Bothkamp.
66.0	-24.7	20.7	Knott ( <i>Ar.</i> f. 33)	62	Oct. 22	8	30	Greenwich.
66.2	+20.3	16.5	Terby f. 21	73	May 10	10	5	Brussels.
67.4	-23.7	21.8	Niessen II. 7	77	Sept. 29	7	30	Brussels.
68.1	-23.1	21.6	Terby II	77	Sept. 30	8	5—8 15	Brussels.
70.6	+20.1	16.5	Lohse f. 3	73	May 9	10	10	Bothkamp.
71.0	+20.3	16.5	Terby f. 22	73	May 10	10	25	Brussels.
76.9	+20.7	16.3	Knobel 9	73	May 13	12	20	Greenwich.
78.1	-26.5	14.2	Knott ( <i>Ar.</i> f. 34)	62	Nov. 27	7	15	Greenwich.
80.4	-22.4	24.4	Cruls III. 1	77	Aug. 24	8	0	Rio de Janeiro.
81.0	-22.4	24.2	Niessen I. 2	77	Aug. 22	10		Brussels.
83.3	+20.6	16.4	Knobel 8	73	May 12	12	10	Greenwich.
84.7	+20.1	16.5	Burton ( <i>Ar.</i> f. 47)	73	May 9	9	24—10 40	Dublin.
(Long. at commencement of sketch 75°.4, at completion 93°.9)								
85.4	-23.5	22.2	Niessen II. 5	77	Sept. 27	7	30	Brussels.
86.1	-23.6	22.0	Terby 9	77	Sept. 28	8	5—8 15	Brussels.
87.4	-22.4	24.7	Cruls VI. 2	77	Aug. 29	11	30	Rio de Janeiro.
89.9	-22.4	24.1	Niessen I. 1	77	Aug. 21	10		Brussels.
89.9	+19.9	16.5	Lohse f. 2	73	May 8	9	53	Bothkamp.
92.0	-26.6	15.1	Niessen V. 2	77	Nov. 3	6	45	Brussels.
93.6	-23.7	21.8	Green 4	77	Sept. 29	9		Greenwich.
95.0	-22.4	24.4	Cruls III. 2	77	Aug. 24	9	0	Rio de Janeiro.

Aerographical Long. and Lat. of the Centre of the Disk.	Diameter. "	Times assigned to the Sketches.			
		Terby 7	1877	h m	h m
96.4 - 23.5	22.2	Terby 7	Sept. 27	8 15	Brussels.
97.8 + 19.9	16.5	Wilson (Ar. f. 50)	May 8	10 45	Greenwich.
100.5 - 26.6	15.1	Nielsen V. 3	Nov. 3	7 20	Brussels.
101.1 - 23.8	21.4	Dreyer 9	Oct. 1	10 45	Greenwich.
				(in text 10 <sup>h</sup> 55 <sup>m</sup> )	
103.3 - 25.5	24.8	Cruls VIII. 1	Sept. 2	15 0	Rio de Janeiro.
104.3 - 23.5	22.2	Terby 8	Sept. 27	8 40—8 55	Brussels.
109.6 - 22.4	24.4	Cruls IV. 1	Aug. 24	10 0	Rio de Janeiro.
111.1 + 24.4	13.9	Lehardelay (Ar. f. 54)	Mar. 11	10 —11	Paris.
112.4 - 26.6	15.3	Nielsen IV. 12	Nov. 2	7 30	Brussels.
114.1 - 23.5	22.3	Lohse 8	Sept. 26	9 27	Berlin.
114.6 - 23.5	22.2	Nielsen II. 6	Sept. 27	9 30	Brussels.
116.5 - 23.4	22.5	Lohse 7	Sept. 25	9 0	Berlin.
130.2 - 23.2	23.0	Nielsen II. 2	Sept. 22	7 30	Brussels.
130.8 - 22.4	24.1	Green 5	Aug. 21	12 30	Greenwich.
132.7 - 23.7	21.8	Weinek 3	Sept. 29	12.5	Leipzig.
135.5 - 23.6	21.9	Dreyer 8	Sept. 28	11 15	Greenwich.
135.8 - 23.2	23.0	Lohse 6	Sept. 22	8 29	Berlin.
136.3 - 23.4	22.5	Nielsen II. 4	Sept. 25	9 45	Brussels.
140.4 - 22.4	24.4	Cruls II. 2	Aug. 23	11 30	Rio de Janeiro.
141.2 - 23.2	23.0	Nielsen II. 3	Sept. 22	8 15	Brussels.

143.9	-23.5	22.1	Cruls XII. 2	77	Sept. 27	8 20	Rio de Janeiro.
147.3	+22.9	14.2	Knobel 17	73	June 8	8 30	Greenwich.
148.4	- 6.6	17.3	Secchi (Ar. f. 45)	64	Dec. 1	7	Rome.
150.1	-23.2	23.2	Nielsen I. 7	77	Sept. 21	8 15	Brussels.
151.9	-23.2	23.2	Terby 6	77	Sept. 21	8 15—8 30	Brussels.
155.3	-23.5	22.3	Cruls XII. 1	77	Sept. 26	8 30	Rio de Janeiro.
160.3	-23.2	23.2	Lohse 5	77	Sept. 21	9 33	Berlin.
161.1	-23.2	23.2	Nielsen I. 8	77	Sept. 21	9	Brussels.
163.9	+18.4	16.5	Terby f. 19	73	Apr. 29	10 5—10 15	Brussels.
165.0	-22.4	23.9	Cruls I. 2	77	Aug. 19	10 45	Rio de Janeiro.
166.2	-22.5	23.6	Cruls I. 1	77	Aug. 16	9 0	Rio de Janeiro.
167.5	-26.0	16.5	Nielsen IV. 9	77	Oct. 26	6 45	Brussels.
170.5	-23.0	23.5	Lohse 4	77	Sept. 20	9 38	Berlin.
174.1	-23.2	23.0	Nielsen I. 9	77	Sept. 22	10 30	Brussels.
175.5	-23.1	23.3	Green 6	77	Sept. 20	9 5	Greenwich.
185.8	-26.0	16.5	Nielsen IV. 10	77	Oct. 26	8	Brussels.
189.3	-22.4	24.0	Cruls II. 1	77	Aug. 19	15 30 corr.	Rio de Janeiro.
190.0	-22.9	23.7	Terby 4	77	Sept. 17	8 30—8 35	Brussels.
191.8	+24.0	13.3	Lohse No. 5	71	Mar. 2	11 9	Bothkamp.
193.5	-22.9	23.7	Lohse 3	77	Sept. 17	9 23	Berlin.
194.0	-23.2	23.2	Nielsen II. 1	77	Sept. 21	11 15	Brussels.
201.1	-22.4	24.4	Cruls IV. 2	77	Aug. 24	16 15 corr.	Rio de Janeiro.

Areographical Long. and Lat. of the Centre of the Disk.	Diameter.		Times assigned to the Sketches.			
			h	m	h	m
2014	+ 17.7	Terby f. 18	1873	Apr. 25	10 15—10 25	Brussels.
2077	— 26.0	Nielsen IV. 11	77	Oct. 26	9 30	Brussels.
2091	— 23.0	Green 7	77	Sept. 18	10 20	Greenwich.
2104	+ 22.7	Lohse f. 7	73	June 2	9 45	Bothkamp.
2115	+ 17.9	Knobel 4	73	Apr. 26	11 20	Greenwich.
2130	+ 22.5	Green No. 1	73	May 30	7 30	Greenwich.
2134	— 22.2	Schmidt ( <i>Ar. f. 39</i> )	62	Oct. 1	7 28	Athens.
2150	— 22.9	Terby 5	77	Sept. 17	10 15	Brussels.
2157	— 22.4	Cruls V. 1	77	Aug. 24	17 15 <i>corr.</i>	Rio de Janeiro.
2186	— 22.9	Nielsen I. 6	77	Sept. 17	10 30	Brussels.
2201	+ 17.3	Terby f. 17	73	Apr. 23	10 10—10 40	Brussels.
2202	— 22.9	Cruls XI. 1	77	Sept. 16	6 50	Rio de Janeiro.
2205	— 23.2	Weinek 2	77	Sept. 21	13.6	Leipzig.
2211	+ 24.0	Vogel No. 4	71	Feb. 28	11 57	Bothkamp.
2217	— 22.8	Nielsen I. 5	77	Sept. 15	9 30	Brussels.
2266	— 23.0	Knott ( <i>Ar. f. 40</i> )	62	Oct. 8	11	Greenwich.
2268	— 23.6	Cruls XIII. 1	77	Sept. 27	14 0 <i>corr.</i>	Rio de Janeiro.
2274	— 25.4	Nielsen IV. 7	77	Oct. 20	7	Brussels.
2290	— 22.9	Dreyer 7	77	Sept. 17	10 55	Greenwich.
2322	— 25.4	Nielsen IV. 6	77	Oct. 20	7 20	Brussels.

232'3	-23'0	23'6	Green 8	77	Sept. 18	11 45	Greenwich.
232'4	+25'9	13'8	Lohse No. 10	71	Apr. 8	11 23	Bothkamp.
234'5	+22'5	15'2	Terby f. 26	73	May 29	8 30—8 35	Brussels.
234'7	+22'6	15'0	Knobel 16	73	May 31	9 30	Greenwich.
235'4	+17'3	16'2	Knobel 2	73	Apr. 23	11 40	Greenwich.
236'7	-26'0	16'5	Nielsen IV. 8	77	Oct. 26	11 30	Brussels.
236'8	+25'9	13'7	Lohse No. 11	71	Apr. 9	12 17	Bothkamp.
237'1	-25'4	17'6	Nielsen IV. 5	77	Oct. 20	7 40	Brussels.
237'2	+26'0	13'6	Lohse No. 12	71	Apr. 10	12 55	Bothkamp.
237'9	-22'8	24'1	Nielsen I. 4	77	Sept. 14	10	Brussels.
237'9	-22'9	23'5	Dreyer 6	77	Sept. 16	10 55	Greenwich.
239'9	+22'4	15'3	Green No. 2 ( <i>Ar. f. 43</i> )	73	May 28	8	Greenwich.
240'9	-22'8	24'1	Terby 3	77	Sept. 14	10 —10 25	Brussels.
241'0	-22'9	23'8	Cruls XI. 2	77	Sept. 16	8 15	Rio de Janeiro.
244'0	+25'8	13'7	Gledhill ( <i>Ar. f. 52</i> )	71	Apr. 8	11 30	Greenwich.
247'0	+25'8	13'9	Gledhill ( <i>Ar. f. 41</i> )	71	Apr. 6	10 30	Greenwich.
248'2	-22'7	24'3	Boeddicker IV. 2	77	Sept. 12	10 5'9	Berlin.
248'7	+22'6	15'1	Knobel 15	73	May 30	9 50	Greenwich.
250'4	-22'8	24'0	Green 9	77	Sept. 15	11 10	Greenwich.
250'5	-25'4	17'6	Nielsen IV. 4	77	Oct. 20	8 35	Brussels.
251'2	+17'3	16'2	Knobel 3	73	Apr. 23	12 15	Greenwich.
253'3	-25'3	18'0	Nielsen IV. 3	77	Oct. 18	7 30	Brussels.

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Areographical Long. and Lat. of the Centre of the Disk.	Diameter.			Times assigned to the Sketches.				
					h	m	h	
253.5	+22.5	Burton ( <i>Ar. f. 20</i> )	1873	May 29	9	—	9 15	Dublin.
256.5	—22.8	Dreyer 5	77	Sept. 15	11	35		Greenwich.
256.7	+16.8	Lohse f. 1.	73	Apr. 20	11	30		Bothkamp.
257.0	+22.0	Schmidt ( <i>Ar. f. 21</i> )	73	May 23	7	41		Athens.
259.8	+27.4	Wilson ( <i>Ar. f. 22</i> )	71	May 12	9			Greenwich.
261.6	+16.5	Terby f. 16	73	Apr. 18	10	5—10	25	Brussels.
?265.3	—22.7	Boeddicker V. 1	77	Sept. 12	<i>circa</i>	11 16		Berlin.
265.9	+25.9	Burton ( <i>Ar. f. 42</i> )	71	Apr. 7	11	39—12	18	Dublin.
266.5	—22.6	Green 10	77	Sept. 10	9	15		Greenwich.
266.9	—22.6	Lohse 2	77	Sept. 10	10	10		Berlin.
267.8	—22.7	Cruls IX. 2	77	Sept. 12	7	40		Rio de Janeiro.
268.7	—22.7	Terby 2	77	Sept. 11	10	5—10	30	Brussels.
269.0	+16.8	Knobel 1	73	Apr. 20	11	40		Greenwich.
271.7	—22.7	Nielsen I. 3	77	Sept. 11	10	30		Brussels.
271.8	+25.7	Crossley & Gledhill ( <i>Ar. f. 18</i> )	71	Apr. 4	11			Greenwich.
272.6	—24.7	Boeddicker V. 2	77	Sept. 12	11	45.6		Berlin.
274.8	—22.6	Lohse 1	77	Sept. 8	9	30		Berlin.
275.5	+25.7	Webb ( <i>Ar. f. 53</i> )	71	Apr. 4	11	15		Greenwich.
279.4	—22.7	Dreyer 4	77	Sept. 12	11	20		Greenwich.
280.5	+21.9	Schmidt ( <i>Ar. f. 16</i> )	73	May 22	8	41		Athens.



281.1	-25.0	18.6	Nielsen III. 8	77	Oct. 15	7 30	Brussels.
282.2	+25.8	13.9	Burton ( <i>Ar. f. 10</i> )	71	Apr. 6	12 6-12 52	Dublin.
283.1	+22.0	15.6	Terby f. 25	73	May 24	8 40-8 55	Brussels.
283.7	+22.4	15.3	Green No. 3 ( <i>Ar. f. 44</i> )	73	May 28	11	Greenwich.
283.7	-22.7	24.3	Cruls X. 1	77	Sept. 12	8 45	Rio de Janeiro.
283.7	-21.6	23.0	Schmidt ( <i>Ar. f. 8</i> )	62	Sept. 26	8 36	Athens.
284.5	-25.0	18.6	Lohse 12	77	Oct. 15	8 20	Berlin.
284.6	-25.4	17.6	Nielsen IV. 2	77	Oct. 20	10 55	Brussels.
286.7	-22.6	24.5	Cruls IX. 1	77	Sept. 10	7 45	Rio de Janeiro.
290.7	+22.2	15.5	Lohse f. 6	73	May 25	10 5	Bothkamp.
291.4	+27.2	11.3	Gledhill ( <i>Ar. f. 51</i> )	71	May 7	8	Greenwich.
295.9	-24.8	19.0	Nielsen III. 6	77	Oct. 13	7 15	Brussels.
297.0	-22.6	24.5	Green 11	77	Sept. 10	11 20	Greenwich.
297.1	-22.6	24.6	Boeddicker II. 1	77	Sept. 8	11 1.5	Berlin.
298.4	-22.5	24.7	Boeddicker I. 2	77	Sept. 6	9 54.6	Berlin.
299.5	+22.0	15.7	Knobel 14	73	May 23	9 0	Greenwich.
300.3	+22.0	15.6	Burton ( <i>Ar. f. 11</i> )	73	May 24	9	Dublin.
304.4	-22.6	24.6	Boeddicker II. 2	77	Sept. 8	11 31.4	Berlin.
304.4	-25.3	18.0	Nielsen IV. 1	77	Oct. 18	11	Brussels.
304.5	+15.8	15.4	Terby f. 15	73	Apr. 13	9 50-10 30	Brussels.
309.8	-22.6	24.6	Dreyer 2	77	Sept. 8	11 0	Greenwich.
310.8	+22.2	15.5	Green No. 4 ( <i>Ar. f. 15</i> )	73	May 25	11	Greenwich.

Times assigned to the Sketches.

Diameter.

Areographical  
Long. and Lat. of the  
Centre of the Disk.

?	311'4	312'4	314'0	314'5	314'8	316'4	317'6	? 322'0	322'2	324'2	325'1	326'3	326'8	327'5	330'8	331'7	332'3	334'5	337'7	340'9
Boeddicker III. 1	Boeddicker III. 2	Lohse II	Trouvelot 4	Terby f. 24	Niesten III. 9	Dreyer 3	Knott ( <i>Ar.</i> f. 26)	Webb ( <i>Ar.</i> f. 13)	Knott ( <i>Ar.</i> f. 9)	Cruls VIII. 2	Vogel No. 9	Schmidt ( <i>Ar.</i> f. 17)	Dreyer I	Green	Boeddicker IV. 1	Trouvelot 3	Lohse No. 8	Wilson ( <i>Ar.</i> f. 14)		
1877	77	77	77	73	73	77	77	62	71	62	77	71	73	77	77	77	73	71	71	
Sept. 8	Oct. 13	Sept. 10	Oct. 14	May 29	May 20	Oct. 15	Sept. 8	Sept. 23	Mar. 29	Nov. 3	Sept. 8	Mar. 29	May 16	Sept. 7	Sept. 8	Sept. 10	May 23	Mar. 25	May 4	
h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m	h m
8	8 15—8 30	13 23'3	9 45	9 0	8 30—8 45	10	? 11 50	8 30	11	9	9 15	11 51	8 15	11 50	12 30	14 38'1	8 30	10 13	8	
circ							Time uncert.													
Berlin.	Brussels.	Berlin.	Berlin.	Cambridge, Mass.	Brussels.	Brussels.	Greenwich.	Greenwich.	Greenwich.	Rio de Janeiro.	Bothkamp.	Athens.	Greenwich.	Greenwich.	Berlin.	Cambridge, Mass.	Bothkamp.	Greenwich.		

343.7	-24.5	19.8	Niessen III. 4	77	Oct. 9	8	Brussels.
344.9	+21.9	15.8	Knobel I3	73	May 22	11 30	Greenwich.
345.2	-24.6	19.6	Lohse IO	77	Oct. IO	9 20	Berlin.
345.5	-24.5	19.8	Terby I4	77	Oct. 9	8 — 8 15	Brussels.
346.0	-22.6	24.6	Weinek I	77	Sept. 8	14.3	Leipzig.
347.1	-22.5	24.7	Boeddicker I. I	77	Sept. 5	12 38.1	Berlin.
349.5	-22.7	24.3	Cruls X. 2	77	Sept. 12	13 15 corr.	Rio de Janeiro.
350.8	-24.8	19.0	Niessen III. 7	77	Oct. 13	11	Brussels.
353.2	-24.8	19.0	Cruls XIII. 2	77	Oct. 13	8 0	Rio de Janeiro.
354.6	+21.5	16.0	Knobel II	73	May 19	10 20	Greenwich.
355.8	-24.6	19.6	Dreyer 12	77	Oct. 10	9 10	Greenwich.

When, some years hence, the direction of the axis of *Mars* shall have become better determined than it is at present, these lists will have to be recomputed, and, with the addition of a select number of the old sketches (and, perhaps, with the omission of some of the modern ones), united into one general list. If it is thought desirable, the assumed First Meridian may then be shifted so as to pass through some definite point of Maedler's spot *a*. Owing to some discrepancies in the sketches of 1862, the assumed meridian 0° passes a little to the west of the middle of spot *a*; but the true amount of the difference can only be determined when proper observations shall have been forthcoming.